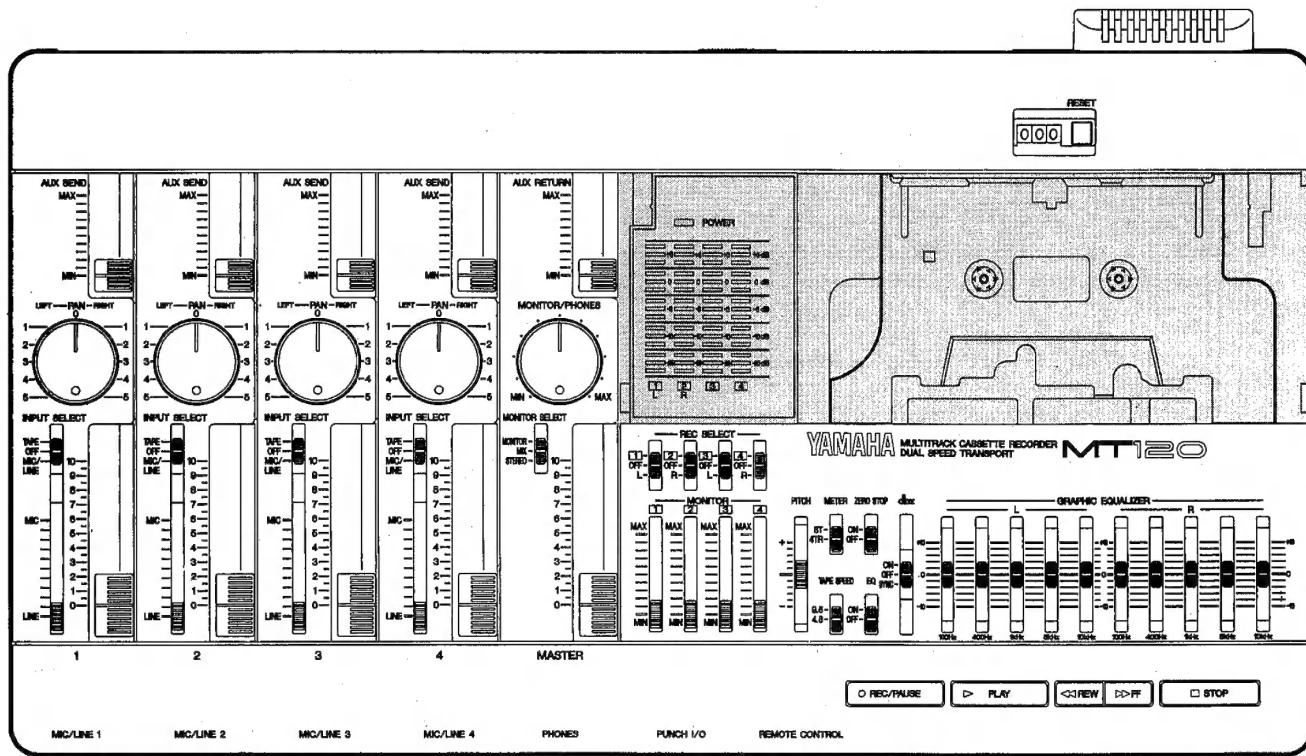


# YAMAHA

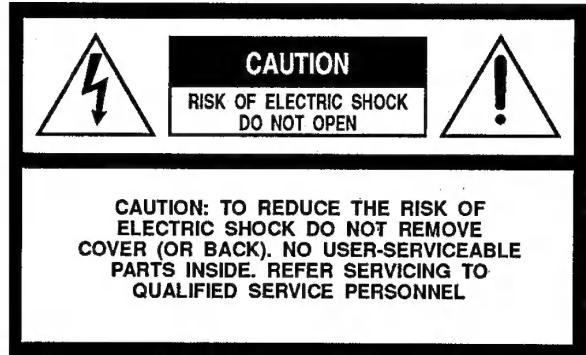
## MULTITRACK CASSETTE RECORDER ENREGISTREUR DE CASSETTES MULTIPISTE MEHRSPUR-KASSETTENDECK

# MT120

### OPERATION MANUAL MANUEL D'INSTRUCTIONS BEDIENUNGSANLEITUNG



## ● Explanation of Graphical Symbols



**CAUTION: TO REDUCE THE RISK OF ELECTRIC SHOCK DO NOT REMOVE COVER (OR BACK). NO USER-SERVICEABLE PARTS INSIDE. REFER SERVICING TO QUALIFIED SERVICE PERSONNEL**



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.



The lightning flash with arrowhead symbol within an equilateral triangle is intended to alert the user of the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

## SAFETY INSTRUCTIONS (PREPARED IN ACCORDANCE WITH UL STANDARD 1270)

1. Read Instructions—All the safety and operating instructions should be read before the appliance is operated.
2. Retain Instructions—The safety and operating instructions should be retained for future reference.
3. Heed Warnings—All warnings on the appliance and in the operating instructions should be adhered to.
4. Follow Instructions—All operating and use instructions should be followed.
5. Water and Moisture—The appliance should not be used near water—for example, near a bathtub, or near a swimming pool, and the like.
6. Carts and Stands—The appliance should be used only with a cart or stand that is recommended by the manufacturer.
  - 5A. An appliance and cart combination should be moved with care. Quick stops, excessive force, and uneven surfaces may cause the appliance and cart combination to overturn.
7. Wall or Ceiling Mounting—The appliance should be mounted to a wall or ceiling only as recommended by the manufacturer.
8. Ventilation—The appliance should be situated so that its location or position does not interfere with its proper ventilation. For example, the appliance should not be situated on a bed, sofa, rug, or similar surface that may block the ventilation openings; or placed in a built-in installation, such as a bookcase or cabinet that may impede the flow of air through the ventilation openings.
9. Heat—The appliance should be situated away from heat sources such as radiators, heat registers, stoves, or other appliances (including amplifiers) that produce heat.



10. Power Sources—The appliance should be connected to a power supply only of the type described in the operating instructions or as marked on the appliance.
11. Grounding or Polarization—The precautions that should be taken so that the grounding or polarization means of an appliance is not defeated.
12. Power-Cord Protection—Power-supply cords should be routed so that they are not likely to be walked on or pinched by items placed upon or against them, paying particular attention to cords at plugs, convenience receptacles, and the point where they exit from the appliance.
13. Cleaning—The appliance should be cleaned only as recommended by the manufacturer.
14. Nonuse Periods—The power cord of the appliance should be unplugged from the outlet when left unused for a long period of time.
15. Object and Liquid Entry—Care should be taken so that objects do not fall and liquids are not spilled into the enclosure through openings.
16. Damage Requiring Service—The appliance should be serviced by qualified service personnel when:
  - A. The power-supply cord or the plug has been damaged; or
  - B. Objects have fallen, or liquid has been spilled into the appliance; or
  - C. The appliance has been exposed to rain; or
  - D. The appliance does not appear to operate normally or exhibits a marked change in performance; or
  - E. The appliance has been dropped, or the enclosure damaged.
17. Servicing—The user should not attempt service the appliance beyond that described in the operating instructions.

## FCC INFORMATION (U.S.A.)

### 1. IMPORTANT NOTICE: DO NOT MODIFY THIS UNIT!

This product, when installed as indicated in the instructions contained in this manual, meets FCC requirements. Modifications not expressly approved by Yamaha may void your authority, granted by the FCC, to use the product.

### 2. IMPORTANT: When connecting this product to accessories and/or another product use only high quality shielded cables. Cable/s supplied with this product MUST be used. Follow all installation instructions. Failure to follow instructions could void your FCC authorization to use this product in the USA.

### 3. NOTE: This product has been tested and found to comply with the requirements listed in FCC Regulations, Part 15 for Class "B" digital devices. Compliance with these requirements provides a reasonable level of assurance that your use of this product in a residential environment will not result in harmful interference with other electronic devices. This equipment generates/uses radio frequencies and, if not installed and used according to the instructions found in the users manual, may cause interference harmful to the operation of other electronic devices. Compliance with FCC regulations does not guarantee that interference will not occur in all installations. If this product is found to be the source of interference, which can be determined by turning the unit "OFF" and "ON", please try to eliminate the problem by using one of the following measures:

Relocate either this product or the device that is being affected by the interference.

Utilize power outlets that are on different branch (circuit breaker or fuse) circuits or install AC line filter/s.

In the case of radio or TV interference, relocate/reorient the antenna. If the antenna lead-in is 300 ohm ribbon lead, change the lead-in to co-axial type cable.

If these corrective measures do not produce satisfactory results, please contact the local retailer authorized to distribute this type of product. If you can not locate the appropriate, please contact Yamaha Corporation of America, Electronic Service Division, 6600 Orangethorpe Ave, Buena Park, CA 90620

\* This applies only to products distributed by YAMAHA CORPORATION OF AMERICA.

## CANADA

THIS DIGITAL APPARATUS DOES NOT EXCEED THE "CLASS B" LIMITS FOR RADIO NOISE EMISSIONS FROM DIGITAL APPARATUS SET OUT IN THE RADIO INTERFERENCE REGULATION OF THE CANADIAN DEPARTMENT OF COMMUNICATIONS.

LE PRESENT APPAREIL NUMERIQUE N'EMET PAS DE BRUITS RADIOELECTRIQUES DEPASSANT LES LIMITES APPLICABLES AUX APPAREILS NUMERIQUES DE LA "CLASSE B" PRESCRITES DANS LE REGLEMENT SUR LE BROUILLAGE RADIOELECTRIQUE EDICTÉ PAR LE MINISTÈRE DES COMMUNICATIONS DU CANADA.

\* This applies only to products distributed by YAMAHA CANADA MUSIC LTD.

Dette apparat overholder det gældende EF-direktiv vedrørende radiostøj.

Cet appareil est conforme aux prescriptions de la directive communautaire 87/308/CEE.

Diese Geräte entsprechen der EG-Richtlinie 82/499/EWG und/oder 87/308/EWG.

This product complies with the radio frequency interference requirements of the Council Directive 82/499/EEC and/or 87/308/EEC.

Questo apparecchio è conforme al D.M.13 aprile 1989 (Direttiva CEE/87/308) sulla soppressione dei radiodisturbi.

Este producto está de acuerdo con los requisitos sobre interferencias de radio frecuencia fijados por el Consejo Directivo 87/308/CEE.

**YAMAHA CORPORATION**

## IMPORTANT NOTICE FOR THE UNITED KINGDOM

### Connecting the Plug and Cord

IMPORTANT. The wires in this mains lead are coloured in accordance with the following code:

BLUE	: NEUTRAL
BROWN	: LIVE

As the colours of the wires in the mains lead of this apparatus may not correspond with the coloured markings identifying the terminals in your plug proceed as follows:

The wire which is coloured BLUE must be connected to the terminal which is marked with the letter N or coloured BLACK.

The wire which is coloured BROWN must be connected to the terminal which is marked with the letter L or coloured RED.

Making sure that neither core is connected to the earth terminal of the three pin plug.

\* This applies only to products distributed by YAMAHA - KEMBLE MUSIC (U.K.) LTD.

## WARNING: CHEMICAL CONTENT NOTICE!

The solder used in the manufacture of this product contains LEAD. In addition, the electrical/electronic and/or plastic (where applicable) components may also contain traces of chemicals found by the California Health and Welfare Agency (and possibly other entities) to cause cancer and/or birth defects or other reproductive harm.

DO NOT REMOVE ANY ENCLOSURE COMPONENTS! There are no user serviceable parts inside. All service should be performed by a service representative authorized by Yamaha to perform such service.

IMPORTANT MESSAGE: Yamaha strives to produce products that are both user safe and environmentally "friendly". We sincerely believe that our products meet these goals. However, in keeping with both the spirit and the letter of various statutes we have included the messages shown above and others in various locations in this manual.

\* This applies only to products distributed by YAMAHA CORPORATION OF AMERICA.

## **CONGRATULATIONS!**

Your MT120 Multitrack Cassette Recorder is a powerful recording tool that will enable you to work with sound in many ways. No other multitrack cassette recorder offers the straightforward simplicity and ease-of-use of the MT120. Whether you need to record acoustic instruments or voice using microphones, electronic instruments and line-level sources, or a creative blend of the two, the MT120 makes the process of building tracks extraordinarily smooth and simple. You can simply record and remix four tracks, or use the multitrack "ping-pong" recording technique to individually record up to ten independent parts — adding sound layer by layer until you create exactly the arrangement and texture your imagination demands with its ability to record on all four tracks at once, or in any combination, MT120 is the ideal choice for recording bands or layering tracks at home. And, because it's a YAMAHA, you know that the MT120 will give you the very finest sound quality and overall performance available. In order to make use of the MT120's many features and obtain maximum performance, we urge you to read this operation manual thoroughly — and keep it in a safe place for later reference.

---

## **CONTENTS**

---

<b>PRECAUTIONS</b>	3
<b>THE CONTROLS AND CONNECTORS</b>	4
<b>MT120 CONTROLS AND THEIR FUNCTIONS</b>	5
<b>CONNECTION EXAMPLES</b>	10
<b>ABOUT CASSETTE TAPES</b>	11
<b>THE RECORDING PROCESS</b>	12
<b>RECORDING THE FIRST TRACK</b>	13
<b>STEP 1: CHANNEL-TO-TRACK ASSIGNMENT</b>	13
<b>STEP 2: MONITOR SETUP</b>	14
<b>STEP 3: SETTING RECORDING LEVELS</b>	15
<b>STEP 4: RECORD</b>	15
<b>OVERDUBBING</b>	16
<b>PING-PONG RECORDING</b>	17
<b>A PING-PONG RECORDING EXAMPLE</b>	18
<b>MIXDOWN</b>	19
<b>USING THE GRAPHIC EQUALIZER</b>	20
<b>USING THE TAPE OUT JACKS</b>	21
<b>USING THE AUX SEND/RETURN LOOP</b>	22
<b>PUNCH-IN/OUT RECORDING</b>	23
<b>MAINTENANCE</b>	24
<b>SPECIFICATIONS</b>	25
<b>BLOCK DIAGRAM</b>	79

# **PRECAUTIONS**

---

## **1. AVOID EXCESSIVE HEAT, HUMIDITY, DUST AND VIBRATION**

Keep the unit away from locations where it is likely to be exposed to high temperatures or humidity — such as near radiators, stoves, etc. Also avoid locations which are subject to excessive dust accumulation or vibration which could cause mechanical damage.

## **2. AVOID PHYSICAL SHOCKS**

Strong physical shocks to the unit can cause damage. Handle it with care.

## **3. DO NOT OPEN THE CASE OR ATTEMPT REPAIRS OR MODIFICATION YOURSELF**

This product contains no user-serviceable parts. For other than routine cleaning, refer maintenance to qualified YAMAHA personnel. Opening the case and/or tampering with the internal circuitry will void the warranty.

## **4. MAKE SURE POWER IS OFF BEFORE MAKING OR REMOVING CONNECTIONS**

Always turn the power OFF prior to connecting or disconnecting cables. This is important to prevent damage to the unit itself as well as other connected equipment.

## **5. HANDLE CABLES CAREFULLY**

Always plug and unplug cables — including the AC cord — by gripping the connector, not the cord.

## **6. CLEAN WITH A SOFT DRY CLOTH**

Never use solvents such as benzine or thinner to clean the unit. Wipe clean with a soft, dry cloth.

## **7. ALWAYS USE THE CORRECT POWER SUPPLY**

The MT120 is sold with the appropriate power specifications for the local area (power supply voltage and power consumption are listed on the bottom panel). If you move to a different area that might have a different AC mains voltage, however, be sure to check with your nearest YAMAHA dealer before using your MT120.

## **8. KEEP THE HEADS AND TAPE PATH CLEAN**

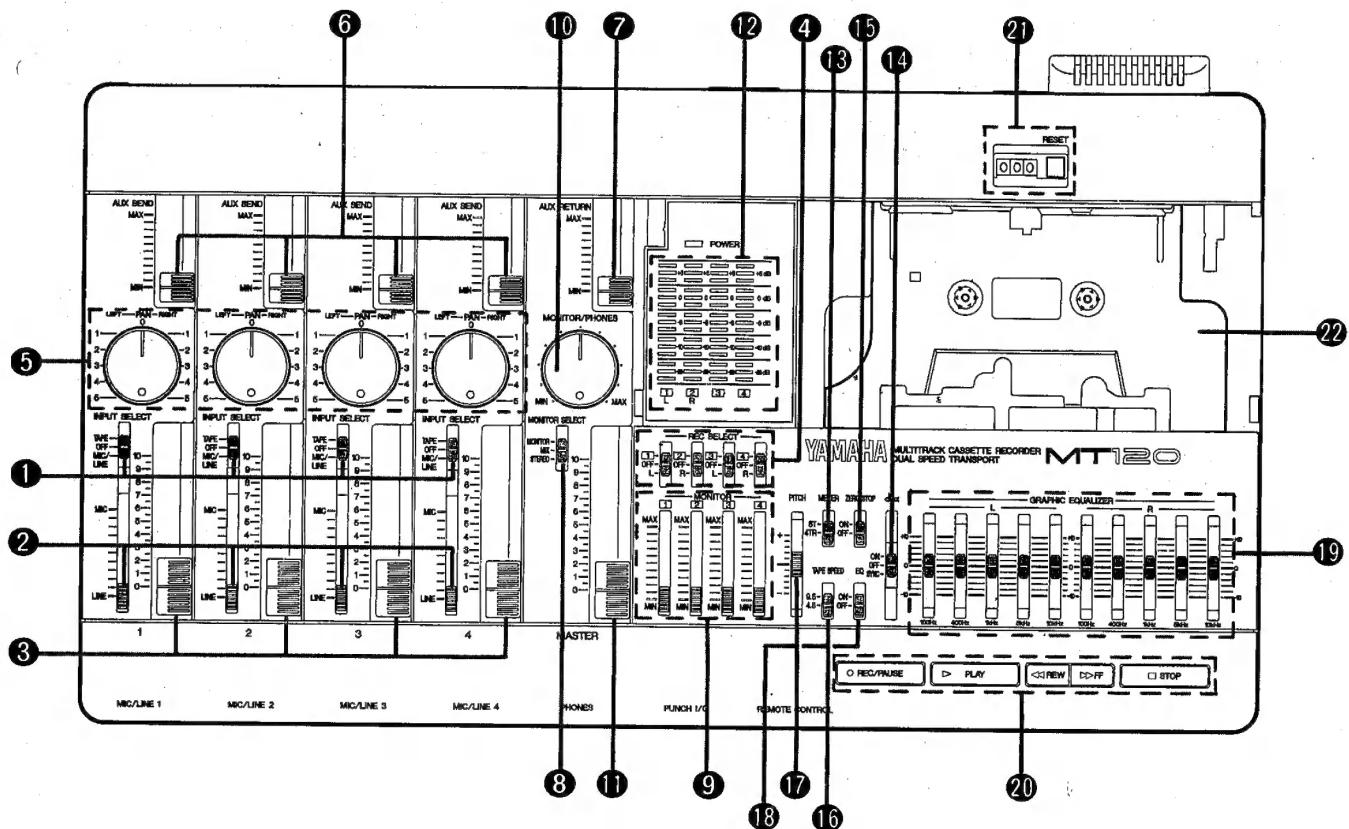
To ensure consistent high performance and sound quality from your MT120, it is important to clean the head and tape path regularly (ideally before each recording session). To do this, use a cleaning kit specifically designed for use with cassette tape equipment.

## **9. USE ONLY HIGH-QUALITY CHROME CASSETTE TAPE**

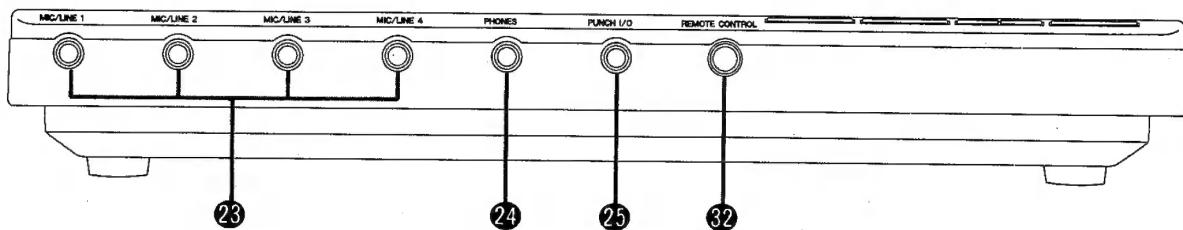
The MT120 is designed for use with CrO<sub>2</sub> (chrome) formulation tape, and will not provide proper performance with any other type of tape. Always choose cassette tapes from a reliable manufacturer.

# THE CONTROLS AND CONNECTORS

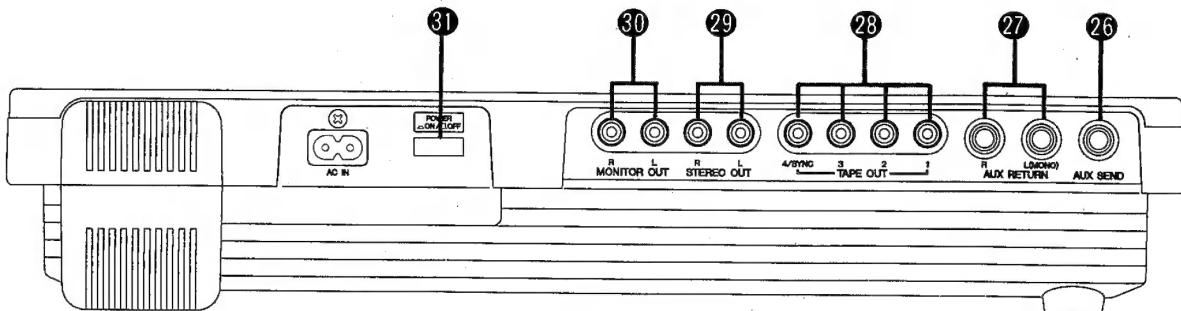
## — CONTROL PANEL —



## — FRONT PANEL —



## — REAR PANEL —



# MT120 CONTROLS AND THEIR FUNCTIONS

**[Note]** The terms "channel" and "track": In this owner's manual, the term "channel" refers to the circuitry and controls required to process one input source. MT120's mixer section has four "channels." The term "track" refers to the magnetic bands on tape used to store signals recorded by MT120's recorder section. Since MT120 records four separate bands of audio on tape, it is a four-"track" recorder.

## ① INPUT SELECT Switches

The INPUT SELECT switches are used to select the input source for each of the four channels.

**TAPE:** Select this position to play back already recorded material. When selected, mixer channel 1 will receive playback from track 1; channels 2, 3, & 4 will receive tracks 2, 3, & 4 respectively.

**OFF:** In this position, the channel receives no input signal.

**MIC/LINE:** In this position, the channel can receive a microphone, keyboard, or other line-level signal which is connected to the input jack.

**[Note]** All channels which are not in use should be set to "OFF" position.

## ② MIC/LINE Gain Controls

The gain controls adjust the sensitivity of the channel inputs to accept a wide range of signal levels — from line to microphone. The gain controls are used in conjunction with the input faders to set the optimum recording level with a wide range of sources (see "SETTING RECORDING LEVELS" on page 15).

**[Note]** A gain control only affects the level of the signal connected to the input jack.

## ③ Input Faders

The input faders are used to adjust the level (volume) of the corresponding mixer channel's signal, whether it comes from a source plugged into an input jack or from the MT120's recorder section. (The INPUT SELECT switches are used to choose between the two.) The faders are used to set up the optimum levels when recording, and to balance (mix) the sound from the recorder's tracks when playing back a recording.

Noise and distortion are at their lowest at input fader level "7".

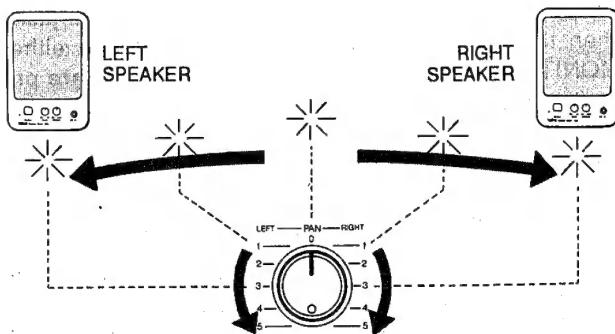
## ④ REC SELECT Switches

The REC SELECT switches are used when recording to assign (send) the signal from each mixer channel either directly to the corresponding track of the recorder or to a different track via the PAN controls (see "CHANNEL-TO-TRACK ASSIGNMENT" on page 13).

**[Note]** When any of the REC SELECT switches are set to a position other than OFF, the red indicator LED of the transport REC/PAUSE button will flash, indicating that the MT120 is set up to record. Recording will commence when the PLAY button is pressed after pressing the REC/PAUSE button. If all REC SELECT switches are set to OFF, the unit will not record even if the REC/PAUSE and PLAY buttons are pressed.

## ⑤ PAN Controls

The PAN controls assign the signal from the corresponding mixer channel to any desired position in the "stereo sound field". If a PAN control is set to the maximum "LEFT" position, the signal from that channel will appear only at the left-channel MT120 output (STEREO OUT L). If the PAN control is set fully RIGHT, the signal will appear only at the STEREO OUT R output jack. If a PAN control is set to its center position, then the signal from that channel will appear equally at both the left- and right-channel outputs, and the sound will appear to come from the center of the stereo sound field, a point midway between the two stereo speakers. By varying the level of the signal sent to the left-and right-channel outputs, the PAN control can be used to position the sound at any point in the stereo spectrum. The PAN controls can also be used during recording to assign the signal from several channels to a single track of the recorder section, or to assign a channel to a differently-numbered recorder track (see "CHANNEL-TO-TRACK ASSIGNMENT" on page 13).



## **⑥ AUX SEND Controls**

The AUX SEND controls are used primarily when adding effects such as reverberation or echo to the sound of a channel or track. The AUX SEND control on each mixer channel determines the amount of signal from that channel sent to the AUX SEND jack. The AUX SEND jack must be connected to the input of an external signal processor such as the YAMAHA EMP100 Multi-effect Processor (see "USING THE AUX SEND/RETURN LOOP" on page 22).

## **⑦ AUX RETURN Control**

The AUX RETURN control determines the level at which the signal from an external signal processor is returned and mixed in with the MT120's main stereo output signal. The output from an external signal processor fed by the AUX SEND jack must be connected to the AUX RETURN jack(s) (see "USING THE AUX SEND/RETURN LOOP" on page 22).

## **⑧ MONITOR SELECT Switch**

**MONITOR:** This position is selected to listen to the four tape tracks. In this position a mix from the four MONITOR controls is sent to the PHONES jack and the MONITOR OUT jack.

**MIX:** This position is selected to hear a combination of the four tape tracks and input sources connected to the input jacks. The mix from the MONITOR controls is combined with the stereo output from the mixer section and sent to the PHONES jack and MONITOR OUT jack.

**STEREO:** This position is selected to monitor the stereo output from the mixer section. In this position, the mix sent to the MONITOR OUT jack and PHONES jack is the same mix that is sent to the STEREO OUT jacks.

## **⑨ MONITOR Controls 1 — 4**

The four MONITOR controls determine the level of the signal from the corresponding recorder tracks which is sent to the PHONES jack and MONITOR OUT jacks when the MONITOR SELECT switch is set to either "MONITOR" or "MIX." The MONITOR controls are primarily used to set up the optimum levels for monitoring recorded tracks while recording new material (overdubbing).

## **⑩ MONITOR/PHONES Control**

This control is used to set headphone and control room listening level. It adjusts the level of signal sent to the PHONES jack and MONITOR OUT jacks without affecting the signal level appearing at the STEREO OUT jacks.

## **⑪ MASTER Fader**

The MASTER fader sets the overall output level of the MT120 mixer section, and thus the level of the output signal appearing at the STEREO OUT jacks. The MASTER fader also affects recording level when any of the mixer section's channels are assigned to the recorder's tracks via the PAN controls (see "SETTING RECORDING LEVELS" on page 15).

## **⑫ LED Peak Meters**

The four LED peak meters accurately display output levels from the MT120's four recorder tracks when the METER switch is set to "4TR," or meters 1 and 2 display the level of signals appearing at the mixer section's stereo outputs (the STEREO OUT jacks) when the METER switch is set to "ST."

The LED peak meters are a guide for setting up the optimum recording levels. (see "SETTING RECORDING LEVELS" on page 15).

## **⑬ METER Switch**

When the METER switch is set to "ST," meters 1 and 2 display the level of signals appearing at the mixer section's stereo outputs (the STEREO OUT jacks). When set to "4TR," the four LED peak meters display the level of the corresponding recorder track signals.

## **⑭ dbx ON/OFF Switch**

The dbx switch determines whether the MT120's internal dbx noise reduction system is ON or OFF. For normal recording and playback using the MT120, the dbx switch should be turned ON. This provides a significantly improved signal-to-noise ratio (as much as 85 dB) so your recordings will sound cleaner and have much less tape hiss.

If dbx noise reduction is to be activated during syncro-recording, set the switch to "SYNC".

For dbx noise reduction to be effective, it must be turned ON both during recording and playback.

The dbx switch may be turned OFF when playing back tapes that were recorded on other equipment and which are not dbx-encoded.

### **"For Error-free SYNC Recording"**

- When recording the FSK signal, set the Track 4 recording level between 0 and +3dB.
- For recording and playback of the FSK signal on Track 4, set the dbx switch to the "SYNC" position.
  - \* When the dbx switch is set to "SYNC", Tracks 1 to 3 are set to dbx ON.
- Do not record signals (music, etc.) other than the FSK signal on Track 4, when the dbx switch is set to the "SYNC" position.
- If other signals (music, etc.) are recorded during recording of the FSK signal, avoid using adjacent tracks, if possible.

## **15 ZERO STOP Switch**

When the transport is in rewind, the ZERO STOP function automatically stops the tape at a specified location. To set the ZERO STOP point, play the tape to the desired location and reset the tape counter to ZERO by pressing the counter reset button. In rewind, with the ZERO STOP switch "ON", the transport will stop when the tape counter reaches the vicinity of "999" (may deviate due to tape slack). This is particularly handy in the multitrack "overdub" process when it is necessary to repeatedly rewind the tape and play from the same point.

## **16 TAPE SPEED Switch**

The TAPE SPEED switch selects either the standard 4.8-cm/sec cassette tape speed, or the MT120's special 9.5-cm/sec high tape speed. Use the standard (4.8) speed when replaying tapes recorded on standard cassette recorders, or to obtain maximum tape economy. When you want maximum sound quality, use the high (9.5) tape speed. The improvement in sound quality provided by the high tape speed is significant, and we recommend that you use the high speed for all important recordings.

**[Note]** Never change the TAPE SPEED setting while the tape is running.

## **17 PITCH Control**

The PITCH control varies tape speed by approx.  $\pm 10\%$ , making it possible to "tune" material recorded on the MT120 to match the pitch of musical instruments, or to slightly lengthen or shorten the running time of a recording to meet specific timing requirements. Tape speed is normal when the PITCH control is set to its center click-stop position. Tape speed is increased by sliding the control towards the "+" end of the scale, and decreased by sliding the control towards the "-" end of the scale.

## **18 EQ Switch**

This switch turns the graphic equalizer on and off.

## **19 Graphic Equalizer**

An equalizer is used to tailor the signal to help it stand out or integrate into a mix. MT120's graphic equalizer is a powerful signal shaping tool which allows you to augment or attenuate signal components up to approx. 10 dB in five frequency bands. The graphic equalizer can be switched ON to enhance signals as they are recorded on tape, and again in playback.

**[Note]** When switched ON, the graphic equalizer can affect signals being routed to tape via the PAN controls when the REC SELECT switches which are set to "L" or "R". The graphic equalizer will not

affect signals being routed to tape via REC SELECT switches which are set to "1 — 4".

## **20 Transport Controls**

These light touch electronic transport controls provide smooth, sure control of the tape transport functions.

**REC/PAUSE Button:** When this button is pressed during tape stop, the REC mode track will be set to the record-ready mode. When this button is pressed during tape recording (first press REC/PAUSE button and then PLAY button), the recording can be interrupted temporarily. For resuming recording, press the PLAY button.

**REC/PAUSE Indicator:** According to its corresponding state (lit, slow/fast/specific blinking, and unlit), the indicator indicates one of the following 5 modes:

- **Indicator lit:** More than one track is set to REC mode and the REC/PAUSE button has been pressed (record-ready mode). Recording of the track set to REC mode is underway (during recording PLAY indicator will light-up as well).
- **Indicator slowly blinking:** More than one track is set to REC mode and the REC/PAUSE button has not been pressed. When pressing PLAY button, the unit will enter not the recording mode but the playback mode.
- **Indicator fast blinking:** Indicates punch-in standby mode.
- **Indicator specifically blinking (warning indication):** The indicator blinks twice in specific intervals. The foot switch is connected to the PUNCH I/O jack and all of the REC SELECT switches are set to "OFF".
- **Indicator unlit:** None of the tracks is set to REC mode (PLAY mode).

**[Note]** Only tracks for which the REC SELECT switch is set to a recording position will be recorded when the RECORD mode is activated.

**[Note]** The RECORD mode **cannot** be activated if a cassette is loaded from which the record-prevention tab has been removed.

**PLAY Button:** Using this button, you can select the 3 functions playback start, recording start, and punch-in/out start.

- **Playback start:** Starts the playback of the track set to PLAY mode (REC SELECT switch set to OFF).
- **Recording start:** Starts the recording of the track set to REC mode (REC SELECT switch not in position OFF) when the record-ready mode has been selected using REC/PAUSE button.

- **Punch-in/out start:** Starts punch-in/out when the foot switch is connected to PUNCH I/O jack, even if the record-ready mode has not been activated using REC/PAUSE button.

**PLAY Indicator:** According to its state (lit, slow/fast blinking), this indicator indicates one of the following 3 modes:

- **Indicator lit:** PLAY button has been pressed.
- **Indicator fast blinking:** FF button or REW button has been pressed during playback (CUE/REVIEW mode).
- **Indicator slowly blinking:** Continues blinking for approximately 4 seconds after the POWER switch has been turned on. (During this period the buttons are inoperative.)

**REW (REWIND):** Press this button the rewind the tape. If the ZERO STOP switch is ON, the tape will stop rewinding when the counter reaches the vicinity of "999."

**FF (FAST FORWARD):** Press this button the wind the tape ahead at high speed. When this button is pressed while in the PLAY mode, the audio will be heard as the tape winds ahead at high speed.

**STOP:** Immediately stops the transport and/or defeats the RECORD mode.

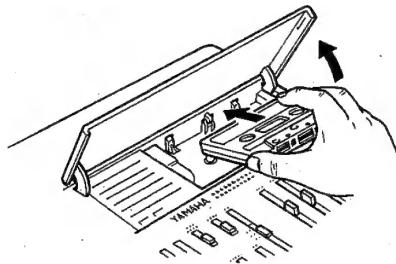
#### ① Tape Counter and RESET Button

This three-digit tape counter provides a handy index of tape position. It's a good idea to write down the counter readings for important points of a recording, so you can locate them easily afterwards. The RESET button resets the counter to "000" at the current tape position. This is a useful function when used in conjunction with the ZERO STOP switch to identify specific positions on the tape.

#### ② Cassette Compartment

Your cassette tape is loaded here. Use **only** high-quality chrome ( $\text{CrO}_2$ ) formula cassette tape. Other tape formulations will not provide optimum frequency response and signal-to-noise performance.

A "lifter-tab" is provided at the right side of the cassette compartment cover. Lift the cover using this tab. Hold the cassette with the open end (the end at which you can see tape) facing the transport controls. First, press the rear edge of the cassette DOWN and UNDER the central retaining finger at the rear of the cassette compartment. Then gently press the front of the cassette DOWN to seat the cassette in place. (SEE DIAGRAM)



**[Note]** Since the MT120 uses the entire width of the cassette tape to record four tracks, the cassette can only be recorded on one side. Never change the TAPE SPEED setting while the tape is running.

#### ③ MIC/LINE Input Jacks 1 — 4

These four input jacks accept signals from microphones, or from line-level sources including, electronic keyboards, electric guitars and basses and tape players. The four channel inputs are standard monaural 1/4" phone jacks. When a source is plugged into one of these jacks, its signal is sent to the corresponding channel of the MT120's mixer.

#### ④ PHONES Jack

Any pair of stereo monitor headphones with an impedance of between approximately 8 and 40 ohms can be plugged into this jack. Headphone monitoring is the most convenient way to listen to the MT120's various signals. High-quality headphones such as the YAMAHA RH5M or MH100 are ideal for this purpose.

#### ⑤ PUNCH I/O Footswitch Jack

An optional YAMAHA FC4 or FC5 Footswitch can be connected to this jack to permit foot-controlled punch-in and punch-out recording (see "PUNCH-IN/OUT RECORDING" on page 23).

#### ⑥ AUX SEND Jack

#### ⑦ AUX RETURN R and L(MONO) Jacks

The AUX SEND and RETURN jacks make it simple to use an external signal processor (such as the YAMAHA EMP100 Multi-effect Processor) to add effects to MT120 signals. The AUX SEND jack should be connected to the input of your signal processor, and the output from your signal processor should be connected to the AUX RETURN jack. If your signal processor produces only monaural output, it should be connected to the L (MONO) AUX RETURN jack (see "USING THE AUX SEND/RETURN LOOP" on page 22).

## ⑧ TAPE OUT Jacks 1 — 4

The four TAPE OUT jacks are direct outputs from the corresponding tracks of the MT120 recorder. These RCA pin type jacks make it possible to feed the output from the four recorder tracks to an external mixing console. The TAPE OUT jacks can also be used to feed each of the recorder's tracks to external signal processors, the output of which can then be returned to the MT120's mixer inputs.

## ⑨ STEREO OUT R and L Jacks

These are the main outputs from the MT120, delivering the stereo output signal from the MT120 mixer section. The RCA pin-type STEREO OUT jacks can be connected to a stereo sound system for monitoring and listening. You can record a mixdown of your tape tracks when these jacks are connected to the inputs of a stereo recorder.

## ⑩ MONITOR OUT R and L Jacks

These jacks output the same signal fed to the PHONES jack (at line level). Control the level (volume) of the output using the MONITOR/PHONES control. The MONITOR OUT jacks can be connected to a stereo sound system for monitoring and listening. They are RCA pin type jacks.

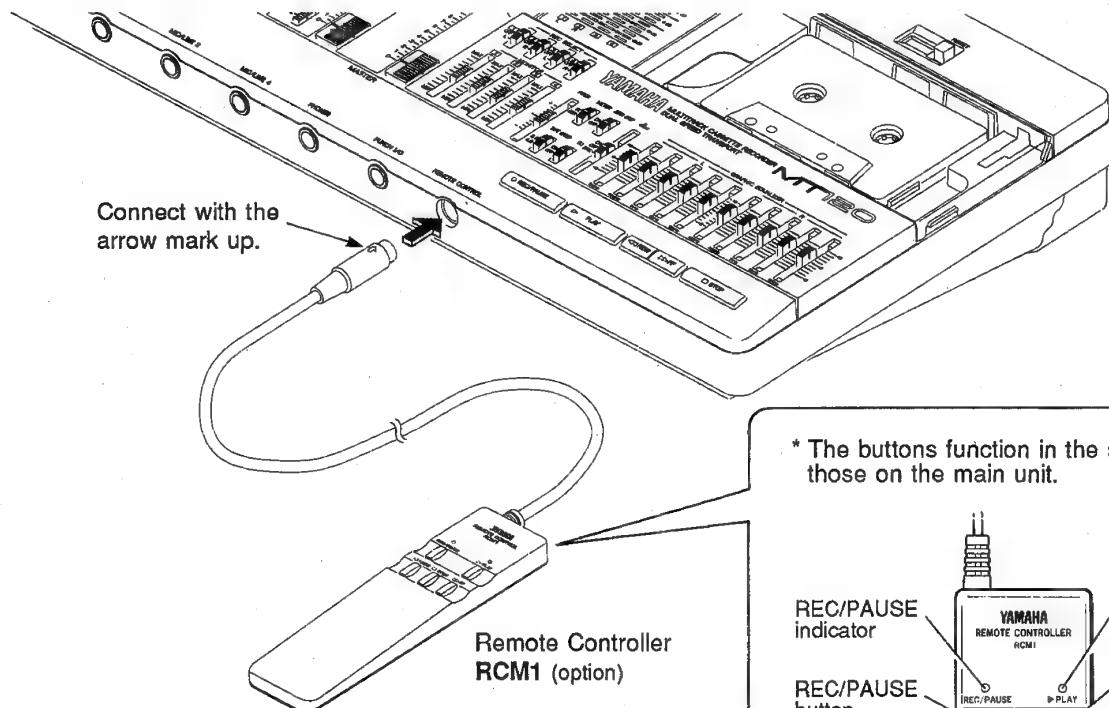
## ⑪ POWER Switch

Press the POWER switch once to turn power ON, a second time to turn power OFF. When the power is ON, the POWER LED above the LED peak meters on the MT120 top panel will light. Make sure that the input faders are set to "0" and the AUX RETURN level control is set to "MIN" before turning power on.

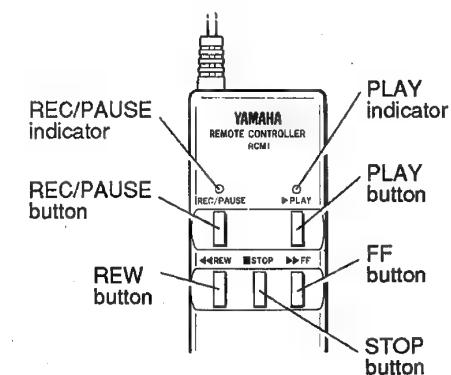
[Note] When the power of the unit is turned on, a initializing function will be activated so that for a period of approximately 4 seconds it can not be operated. During the initialisation process the PLAY indicator will blink slowly.

## ⑫ REMOTE CONTROL connector

When the optional Remote Controller RCM1 is connected, tape transport operations (REC/PAUSE, PLAY, REW, FF, STOP) can be performed from a distance.



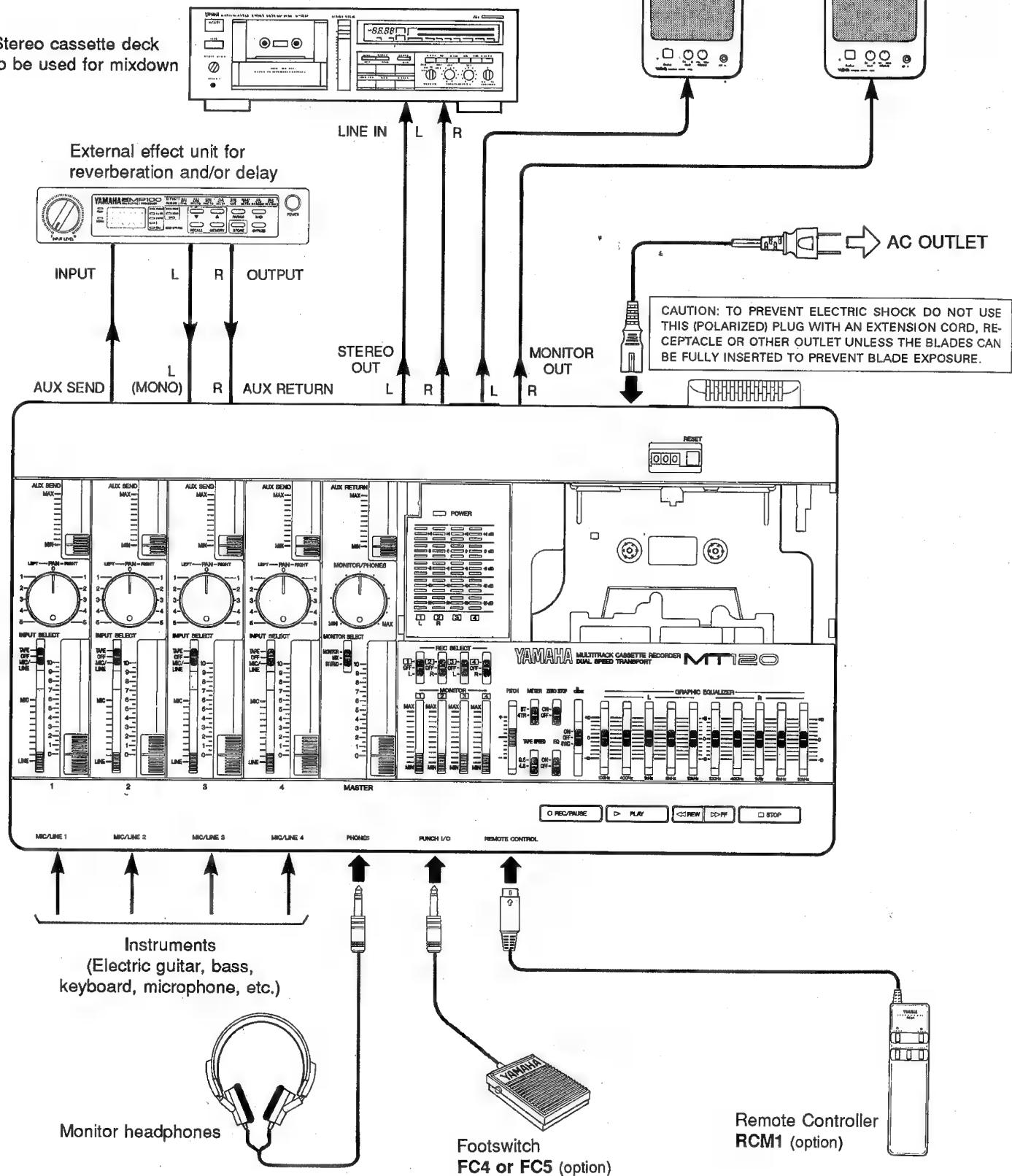
\* The buttons function in the same way as those on the main unit.



# CONNECTION EXAMPLES

## — BASIC CONNECTIONS —

\* Make sure the power to all equipment is OFF when making connections.



# ABOUT CASSETTE TAPES

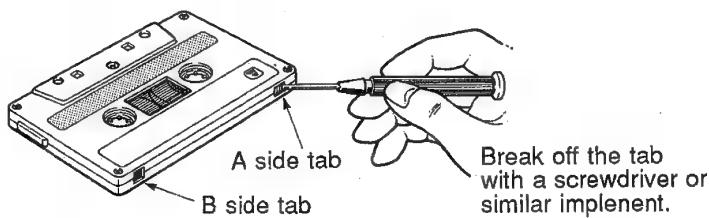
This unit is designed to be used **only with Chromeposition tape**, and will not work properly with Ferrichrome tape formulations. CrO<sub>2</sub> tape (Bias: HIGH; EQ: 70μs) should be used. Also, the use tapes longer than 90 minutes (C-120, etc.) is not recommended because they exhibit poorer performance, and can be the cause of equipment failure.

## • Preventing accidental erasure of recordings

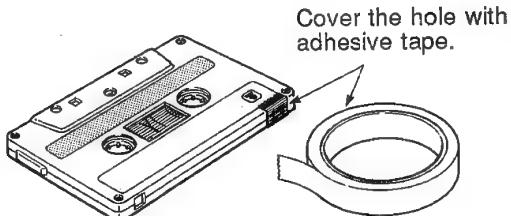
To keep from inadvertently erasing a prized recording, all cassette tapes have record protection tabs along the rear edge of the cassette shell. If this tab is broken out using a screwdriver or any other appropriate implement, it will not be possible to record on the corresponding side of the tape. This will protect your recordings from accidental erasure. To protect a 4-track recording, it's necessary to break out the tabs for both the A and B sides of the tape.

When you'd like to record over a tape with the tabs broken out, just cover the holes (where the tabs were) with a small piece of adhesive tape.

## • PREVENTING ACCIDENTAL TAPE ERASURE:

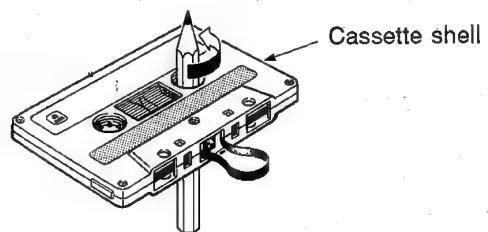


## • RECORDING OVER A TAPE WITH THE TABS BROKEN OUT:



## • Taking up tape slack

If the tape in the cassette is slack, or some portion of the tape is out of the cassette shell, there is a risk it may become tangled around the capstan or pinchroller. In order to correct this, insert a pencil or ballpoint pen into the center of one reel, and rotate to take up loose tape slack.



## • Storing cassette tapes

To prevent tape slack during storage, keep tapes in their cases. Do not store tapes in direct sunlight, or in places with high heat or humidity, as this may damage the tapes. Also, keep the tapes away from magnetic fields, emitted from devices such as televisions or speakers, because the recordings can be erased or sonically altered to some degree.

# THE RECORDING PROCESS

For details pertaining to the operation of MT120 controls, please refer to page 5, "MT120 CONTROLS AND THEIR FUNCTIONS".

*Recording with the MT120 is a very simple process. All you need is the MT120, a pair of monitor headphones, and an instrument, microphone, or other signal source.*

The multitrack recording process can be basically broken down into the following steps:

**1. Record the First Track.**

- a) Select channel-to-track assignment for input source.
- b) Set Record Level.
- c) Record.

**2. Overdub on the Remaining Tracks.**

- a) Select channel-to-track assignment for each overdub.
- b) Set records level for each overdub.
- c) Record the overdub.

**3. Track Combining.**

- a) If necessary, use "ping pong" technique to combine tracks and clear them for additional overdubs.

**4. Mixdown.**

- a) Set up for monitoring the mix.
- b) Set up a rough mix and add effects.
- c) Finalize and rehearse the mix.
- d) Connect the MT120 STEREO OUT jacks to a stereo cassette recorder.
- e) Record (from the MT120 to the stereo cassette recorder).

These steps (and what the recording terms mean) will be described in detail below, so its a good idea to read through the following sections in sequence in order to get a clear picture of the overall recording process.

# RECORDING THE FIRST TRACK

## STEP 1: CHANNEL-TO-TRACK ASSIGNMENT

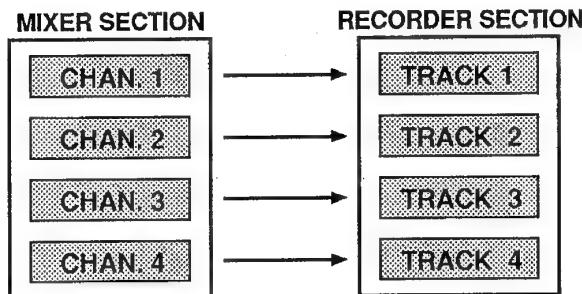
The first step in making any recording is to assign the channel to which your instrument or other source is connected to one of the recorder's tracks.

Depending on what you are recording, you might want to record a single instrument or other source on a single track of the tape, or you might want to combine several instruments or other sources and record them on a single track. The MT120 offers two "channel-to-track assignment" methods.

### Direct Channel-to-Track Assignment

With this method, an instrument or source connected to one of the mixer's channels is fed directly to the correspondingly numbered track of the recorder. You can record a single track like this, or up to all four tracks simultaneously. Using this method, only one input source can be recorded on a single track.

For direct channel-to-track assignment, the REC SELECT switches are set to the "number" position (1, 2, 3 or 4). For example, if the channel 1 REC SELECT switch is set to "1," the channel 1 signal will be sent directly to track 1 of the recorder. This applies in the same way to all other channels and tracks.



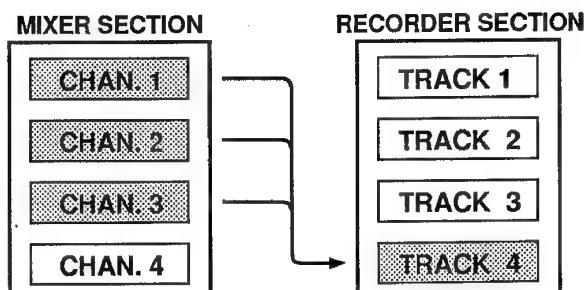
DIRECT CHANNEL - TO - TRACK ASSIGNMENT

### Panned Channel-to-Track Assignment

The panned channel-to-track assignment method makes it possible to assign several of the mixer's channels to a single recorder track, or single mixer channels can be assigned to a track of a different numbers.

Each of the REC SELECT switches has either an "L" or "R" position. These correspond to the left (L) and right (R) channels of the mixer's stereo output. If track 1's REC SELECT switch is set to "L" for example, track 1 will receive any signals which are "panned" LEFT. Therefore, it is possible to send the signal from channel 1 to track 4 by selecting "R" on track 4's REC SELECT switch and panning channel 1 RIGHT. In addition, any other channels which are panned RIGHT will also be recorded on track 4 if the faders for those channels are at raised. The assignment illustrated below is achieved by setting track 4's REC SELECT switch to "R" and setting the PAN controls on channels 1, 2 and 3 fully right. Channel 4's pan control is set fully LEFT to prevent its signal from reaching track 4 of the recorder.

[Note] When a REC SELECT switch is set to "L" or "R" the track will also record signal from the "LEFT or RIGHT side" of the AUX return. Therefore, effects can be recorded along with input sources.



PANNED CHANNEL - TO - TRACK ASSIGNMENT

## STEP 2: MONITOR SETUP

Once your source is connected to an input channel and that channel is assigned to one of the recorder's tracks, you should set up your monitor system so that you can listen to the track as it is recorded.

The MT120 allows you to monitor the material being recorded either via a pair of headphones connected to the PHONES jack or via a sound system with speakers connected to the MONITOR OUT jacks. The level appearing at the PHONES jack and MONITOR OUT jacks is controlled by the MONITOR/PHONES control. The MONITOR SELECT switch has three positions which allow you to listen to tape tracks only (MONITOR position), input sources (STEREO position), or a combination (MIX position).

**MONITOR:** In this position only the output from the recorder's four tracks is sent directly to the PHONES jack and the MONITOR OUT jacks via the four MONITOR controls. The MONITOR controls are used to create the desired monitor "mix". This setup is ideal for general monitoring while recording because it allows you to listen to the four tape tracks while leaving input faders available to route signal sources to tape. Material already recorded on any of the recorder's tracks is delivered to the PHONES jack and MONITOR OUT jacks via the corresponding MONITOR controls. In this case, an input source can only be heard when it is assigned to a track via the appropriate REC SELECT switch, and the TRANSPORT controls are in the RECORD or RECORD/PAUSE mode.

**MIX:** Both the output from the recorder's four tracks (via the MONITOR controls) and the stereo output from the mixer section are sent to the PHONES jack and MONITOR OUT jacks.

**STEREO:** Only the stereo output from the mixer section is sent to the PHONES jack and MONITOR OUT jacks. This setting is most useful for mixdown of a completed multitrack recording, since you want to hear the mix produced by the mixer section's input faders and any effects applied using the AUX SEND and RETURN controls while mixing.

**[Note]** Speakers should not be used for monitoring if you will be recording via microphones, since the monitor sound will leak into the microphone(s) and spoil the recording.

## STEP 3: SETTING RECORDING LEVELS

*Setting optimum recording levels is vitally important to achieve the best possible recording quality.*

1. Make sure that a cassette has been loaded into the cassette compartment, and that it is wound to the point at which you intend to start your recording. It's a good idea to press the counter RESET button to set the counter to "000" at this point so that you can automatically locate the beginning of the recording later using the ZERO STOP function.
2. Start by setting the channel input fader to be used set to its minimum ("0") position, and the MIC/LINE gain control all the way to LINE.
3. Press transport REC/PAUSE button, this activates MT120's record circuit, and puts the transport in RECORD/PAUSE mode. Tape will not be moving. Play the source at the highest (loudest) level that it will be played during recording.
4. Set the MASTER fader to about "7" or "8" on the scale and gradually raise the input fader until you begin to hear the source sound and see the LED peak meter come to life. If your source is an electric instrument (guitar or bass) or a microphone, you may also have to slide the MIC/LINE gain control towards the MIC end of its scale to get a sufficiently high meter reading. Adjust the input fader and MIC/LINE gain control so that the meter reading averages between about "0" and "+3" on the scale. Ideally, the input fader should be set at about "7" or "8" on its scale to achieve the above-mentioned meter reading. This is to ensure the best possible signal-to-noise ratio and allow plenty of plus and minus leeway for later adjustment. If the fader setting is way off, try adjusting the volume control on the instrument or other source until you can get the optimum reading with a fader setting between "7" and "8." After levels are set, press STOP button to disengage RECORD/PAUSE transport status.

## STEP 4: RECORD

*When you have inserted a cassette, assigned the input channel to a recorder track, checked the monitor settings and set the optimum record level for the new track, you're ready to record.*

**[Note]** Make sure the PITCH control is OFF (slider in the center position) while recording your first track.

1. Press the REC/PAUSE button and then the PLAY button to start recording, wait a few seconds, and start playing.
2. When you've finished recording the track, press the transport STOP button, turn the REC SELECT switch for the track just recorded to the OFF position, rewind the tape (the tape will stop automatically at a counter reading around "999" if the ZERO STOP switch is ON).
3. Play back the recording (press the PLAY button) and listen to the track to make sure that everything went as planned.

**[Note]** If you plan to record using microphones and you will be monitoring in the same room as where the microphones are set up, we recommend the use of headphones while actual recording is taking place. If speakers are used for monitoring during recording, their sound can "leak" back into the microphones compromising the quality of your recording.

# OVERDUBBING

*Overdubbing is the process of recording a new track (or new tracks) while monitoring previously recorded tracks. If you're only planning to record a maximum of four tracks, you can go ahead and overdub the second, third and fourth tracks. If you're planning to use the "ping-pong" recording technique to record more than four parts, however, record only three tracks and then move on to the ping-pong step (see "PING-PONG RECORDING" on page 17).*

1. Plug the instrument or other source to be recorded into an available channel input.
2. Make sure that the REC SELECT switches of previously-recorded tracks are set to OFF so that previously recorded tracks aren't erased when the new track is recorded.
3. Set up the channel-to-track assignment for the new track.
4. Check your monitor settings to ensure that you can monitor the previously recorded track(s) as well as the new track to be recorded (the MONITOR SELECT switch should normally be set to MONITOR.)
5. Set the recording level for the new track.
6. You can now "rehearse" the overdub without actually recording by simply playing back the already-recorded track(s) and playing the new part. When MONITOR select is in the MONITOR position, it is not possible to hear input source unless MT120's transport is in RECORD or RECORD/PAUSE. If you are not ready to actually record your overdub, and would like to hear the new input source along with previously recorded tracks, set the MONITOR select switch to the MIX position.
7. Make sure the tape is rewound to the beginning of the piece and start recording.

These steps are simply repeated to overdub tracks 3 and 4.

# PING-PONG RECORDING

Ping-pong recording is a technique you can use to squeeze more than just 4 parts onto your 4-track machine. This is accomplished by re-recording a mix of existing tracks onto an open track. Once tracks have been combined in this way on a new track, the original tracks can be erased, clearing them for additional overdubs.

In ping-pong recording, you can record parts on tracks 1, 2, and 3, for example, and then re-record these tracks onto track 4, using the mixer controls to set up the right balance between the 3 original tracks. You now have a "mix" of the first 3 tracks on track 4, and tracks 1, 2, and 3 are available for more recording. That's already the equivalent of 6 "tracks" on your 4-track recorder. While mixing the first 3 tracks down onto track 4 you can also mix in a live instrument via the MT120 mixer section. That would give you 4 parts recorded on track 4 of the tape. With the 3 tracks you still have available for recording, that's a total of 7 tracks. Now, if you record only 2 of the remaining tracks and ping-pong these to track 3 while mixing in another live instrument, you'll have 4 parts on tracks 4, 3 parts on track 3, and 2 tracks available. That's a total of 9. Following this procedure it is actually possible to record up to 10 individual tracks without re-recording any single track more than once (refer to the illustration).

**[Note]** Ping-ponging is a critical step because the tracks to be ping-ponged must be mixed **perfectly** before you can go on to recording the subsequent tracks. This is because once they're ping-ponged and new material has been recorded on the original tracks, their balance and individual sound **cannot** be changed unless you go back and record the original tracks all over again.

**[Note]** It is recommended that you record using the 9.5 cm/sec tape speed with dbx ON if you plan to combine tracks using the ping-pong technique. Under some conditions, use of the 4.8 cm/sec tape speed with noise reduction OFF will cause feedback when a previously recorded track is re-recorded onto an adjacent track.

**[Note]** Ping-Pong recording technique requires that multiple tracks are directed to tape via PAN controls. Remember that a signal appearing at the stereo AUX RETURN will also be added along with the tracks being recorded or ping-ponged. To prevent an effect from being recorded, set the AUX RETURN fader to "0" (all the way off).

**EXAMPLE:** Recording tracks "1" through "10" using the Ping-pong process.

Record parts 1, II and 3.	Ping-Pong 1, 2 and 3 to track 4 while adding part 4.	Record parts II and 6.	Ping-Pong II and III to track 3 while adding part 7.	Move 8 to track III while adding 9.	Record 10 the last part.						
TRACK 1 <table border="1"><tr><td>1</td></tr></table>	1	<table border="1"><tr><td>1, 2, 3 + 4</td></tr></table>	1, 2, 3 + 4	TRACK 2 <table border="1"><tr><td>2</td></tr></table>	2	<table border="1"><tr><td>5</td></tr></table>	5	TRACK 3 <table border="1"><tr><td>3</td></tr></table>	3	<table border="1"><tr><td>6</td></tr></table>	6
1											
1, 2, 3 + 4											
2											
5											
3											
6											
TRACK 4 <table border="1"><tr><td>1, 2, 3 + 4</td></tr></table>	1, 2, 3 + 4	<table border="1"><tr><td>1, 2, 3 + 4</td></tr></table>	1, 2, 3 + 4		<table border="1"><tr><td>5, 6 + 7</td></tr></table>	5, 6 + 7	<table border="1"><tr><td>8 + 9</td></tr></table>	8 + 9	<table border="1"><tr><td>10</td></tr></table>	10	
1, 2, 3 + 4											
1, 2, 3 + 4											
5, 6 + 7											
8 + 9											
10											
			<table border="1"><tr><td>1, 2, 3 + 4</td></tr></table>	1, 2, 3 + 4	<table border="1"><tr><td>5, 6 + 7</td></tr></table>	5, 6 + 7	<table border="1"><tr><td>8 + 9</td></tr></table>	8 + 9			
1, 2, 3 + 4											
5, 6 + 7											
8 + 9											
				<table border="1"><tr><td>1, 2, 3 + 4</td></tr></table>	1, 2, 3 + 4	<table border="1"><tr><td>5, 6 + 7</td></tr></table>	5, 6 + 7				
1, 2, 3 + 4											
5, 6 + 7											
					<table border="1"><tr><td>1, 2, 3 + 4</td></tr></table>	1, 2, 3 + 4					
1, 2, 3 + 4											

## A PING-PONG RECORDING EXAMPLE

The following is an example of how you would ping-pong material recorded on tracks 1, 2 and 3 onto track 4.

Here's how the controls should be set:

### • **INPUT SELECT switches**

Make sure that the channel 1,2 and 3 INPUT SELECT switches are set to TAPE and the channel-4 INPUT SELECT switch is set to OFF.

### • **Input Faders**

To begin with, set the input 1 through 3 faders to about "7" on their scales, and set the MASTER fader to "0."

### • **REC SELECT Switches**

The channel 1 through 3 REC SELECT switches must be set to OFF, and the channel-4 REC SELECT switch should be set to "R."

### • **AUX SEND Controls**

Set all four AUX SEND controls to MIN for the time being.

### • **GRAPHIC EQUALIZER Switch**

Switch this OFF for the time being.

### • **PAN Controls**

Since the channel-4 REC SELECT switch is set to "R," the channel 1 through 3 PAN controls must be rotated full clockwise (right) to assign the track 1, 2 and 3 signals to track 4 of the tape. The channel-4 PAN control can be set to center.

### • **AUX RETURN Control**

Set to MIN for the time being.

### • **MONITOR SELECT Switch**

Set to MIX so you'll only hear signals from the MT120 recorder.

### • **MONITOR Controls**

Set the channel 1 through 3 MONITOR controls fully counter-clockwise, and the channel-4 MONITOR control to about center or a position that will provide the best monitoring level.

1. Play back the tape. Gradually increase the MASTER fader setting until you can hear the tracks you've recorded and the channel-4 meter reads around "0" on the meter scale. Adjust the MONITOR 4 control for the most comfortable monitoring level.

2. Adjust the input 1, 2 and 3 faders — carefully — until you get the desired balance between the first three tracks. You'll notice that as you adjust the balance between tracks the channel-4 meter reading might change considerably. You'll have to compensate for this as you set up the ping-pong mix by adjusting the MASTER fader.

3. At this time the GRAPHIC EQUALIZER may be switched "on" and used to enhance the sound-quality of tracks as they are combined.

4. AUX SEND controls on the channels may be used to add an effect to the balance. The amount of effect added is controlled by the AUX RETURN fader.

5. When everything is set up perfectly, rewind the tape to the beginning and start recording. Sit back and wait until the ping-pong is complete, then stop the recorder. Now play back the tape and listen to the ping-ponged track carefully. If something sounds odd, go back and repeat the ping-pong process. You can do this as many times as necessary until you get it right — then go on to the next step.

6. Complete your recording by overdubbing and using the Ping-Pong technique as necessary.

**[Note]** Only one output (left or right) of the effect will be recorded. If the RECORD SELECT switch is set to "L", the output of the effect processor connected to the LEFT AUX RETURN jack will be recorded. If the RECORD SELECT switch is set to "R", the output of the effect processor connected to the RIGHT AUX RETURN jack will be recorded.

# MIXDOWN

---

*Mixdown is the last stage in the recording process at which time you can blend and polish the sounds to create the final product.*

A "MIX" is created by finely balancing the four tracks to achieve just the right sound. This final balance is achieved using MT120's mixer section and is re-recorded onto a conventional stereo tape deck. Tracks can be faded in or out as required, and refinements such as overall reverberation or equalization can be added using external signal processing equipment and MT120's 5-band on-board GRAPHIC EQUALIZER. The mixer's PAN controls can be used to position each track at their appropriate location in the stereo image, and you may even want to move or PAN a sound from one channel to the other to create a dramatic effect.

Here's how your system should be set up:

**•INPUT SELECT Switches**

Make sure that all four INPUT SELECT switches are set to TAPE.

**•Input Faders**

Set all channels to "0" (minimum).

**•REC SELECT Switches**

Set all REC SELECT Switches to OFF.

**•AUX SEND Controls**

Set all four AUX SEND controls to MIN for the time being.

**•GRAPHIC EQUALIZER Switch**

Switch this OFF for the time being.

**•PAN Controls**

Start with all PAN controls set to center.

**•MASTER Fader**

Set to about "7" or "8" on the scale.

**•AUX RETURN Control**

Set to MIN for the time being.

**•MONITOR SELECT Switch**

You will want to monitor the same signal which appears at the STEREO OUT jacks, so set this switch to STEREO. We recommend using an external sound system or a pair of powered monitor speakers (such as the YAMAHA MS101 Monitor Speaker) for mixdown.

**•MONITOR Controls**

Set all MONITOR controls fully counter-clockwise.

**•METER Switch**

ST.

**•dbx Switch**

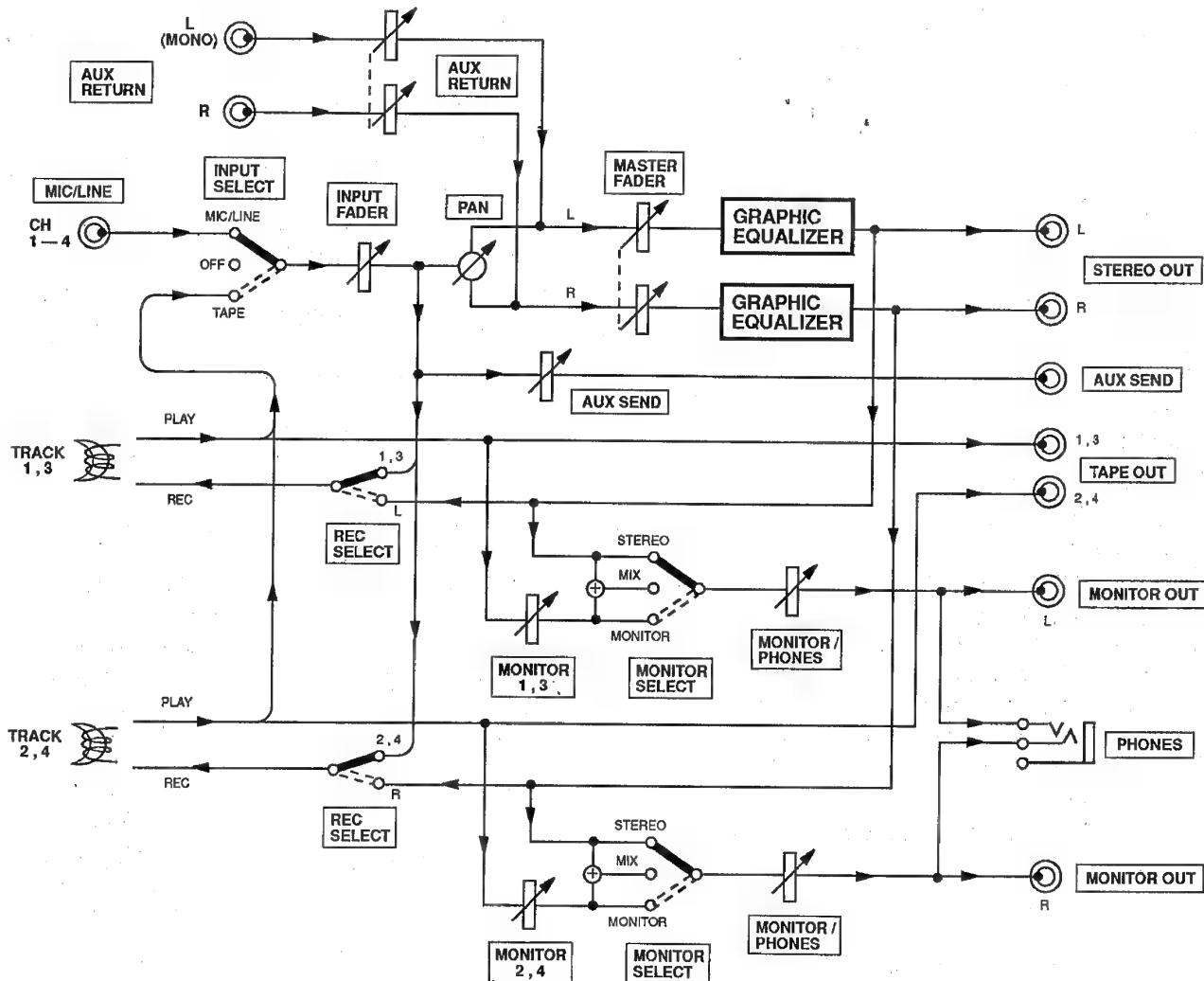
If you started recording with the dbx switch set to ON, leave it there. If OFF, it should stay OFF.

1. Sit in a comfortable, central position in front of your monitor speakers.
2. Listen to, evaluate, and adjust the sound of each track individually. This simply means raising the fader of a single track, adding effects or other signal processing as required, then repeating the process on the next track until all tracks have been carefully checked. MT120's 5-band GRAPHIC EQUALIZER can be used to add or subtract high, mid, and low frequency components from the overall mix, creating a more exciting and coherent marriage of the tracks. If you have an external signal processing device such as the YAMAHA EMP100 Multi-effect Processor connected into the MT120's AUX SEND/RETURN loop as described in the following section ("USING THE AUX SEND/RETURN LOOP"), it's a simple matter to select the desired effect on your signal processor and add the required amount of effect to each track using the AUX SEND controls. The AUX RETURN control must also be set to an appropriate level.
3. When all tracks have been individually checked, bring all input faders up to about "7" or "8" on the scale and play back the tape. Adjust the faders for the best overall balance. Now adjust the PAN controls to place each track at the desired location in the stereo sound field. Now listen carefully — too much or too little reverb on any track? Readjust the AUX SEND controls to achieve the desired effect. Balance not quite right? Keep readjusting until you are satisfied. You should also rehearse any fades or pans you plan to do while actually recording the mix.
4. When you're sure everything is ready, prepare to actually record the mix. Connect the MT120 STEREO OUT jacks to the inputs of a stereo cassette recorder. Plug your monitor headphones into the stereo cassette deck phones jack if you want to listen as you record the mix, or simply leave them connected to the MT120 PHONES jack and listen with the MONITOR SELECT switch set to STEREO. Use the stereo cassette deck record level control(s) and, if necessary, the MT120 MASTER fader to set the optimum record level, then go ahead and record. The MT120 MASTER fader can also be used to add a slow fade at the end of the piece.

# USING THE GRAPHIC EQUALIZER

The MT120 has a stereo 5-band graphic equalizer built in. As the block diagram below makes clear, signals assigned to the left and right channels by the PAN control and level adjusted using the MASTER fader are sent to the equalizer. Therefore, it can be used during ping-pong recording, mixdown operation and when recording with the REC SELECT control set to "L" or "R." The equalizer cannot be used when the REC SELECT control is set to "1" — "4," however, since each channel signal is recorded directly on the appropriate track.

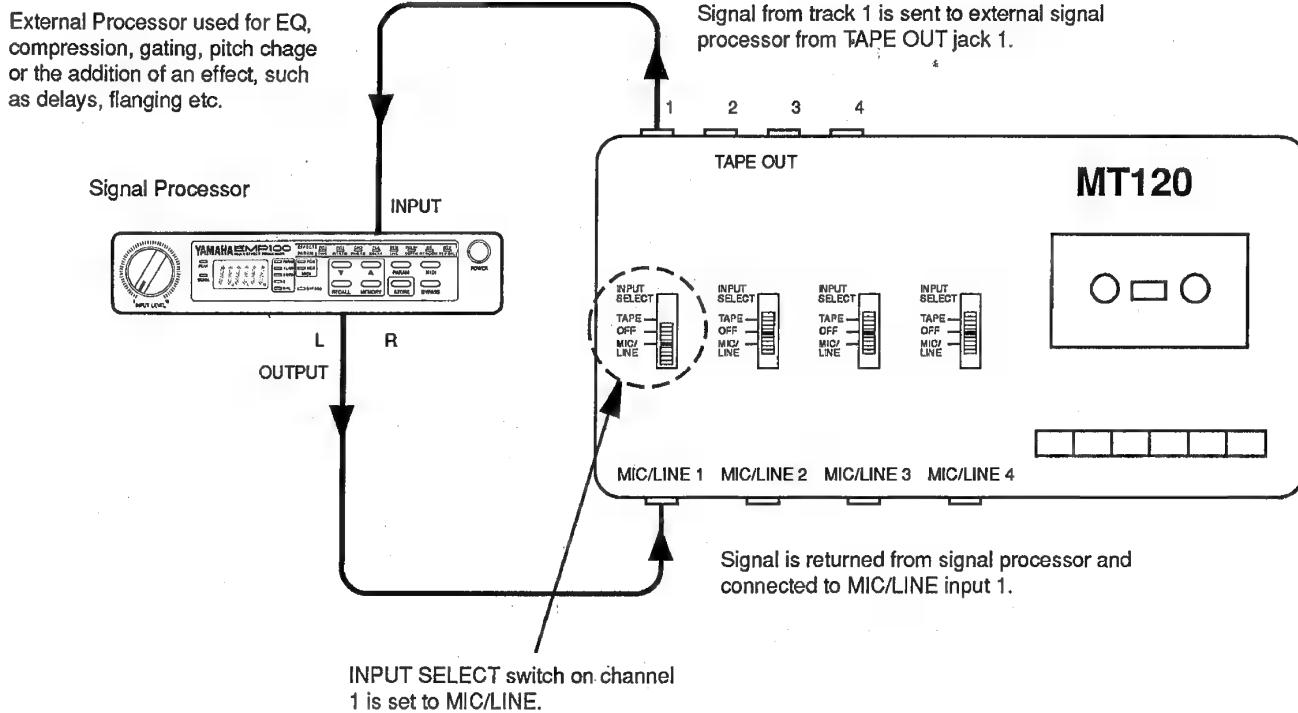
The graphic equalizer affects only the signal paths marked with bold lines in the diagram below.



# USING THE TAPE OUT JACKS

The tape out jacks can be used to feed the tape outputs to an external mixer. In mixdown, individual tracks can be processed using a signal processor, which receives signal from the TAPE OUT jack and the output of which is returned to ■ channel's INPUT jack. See diagram.

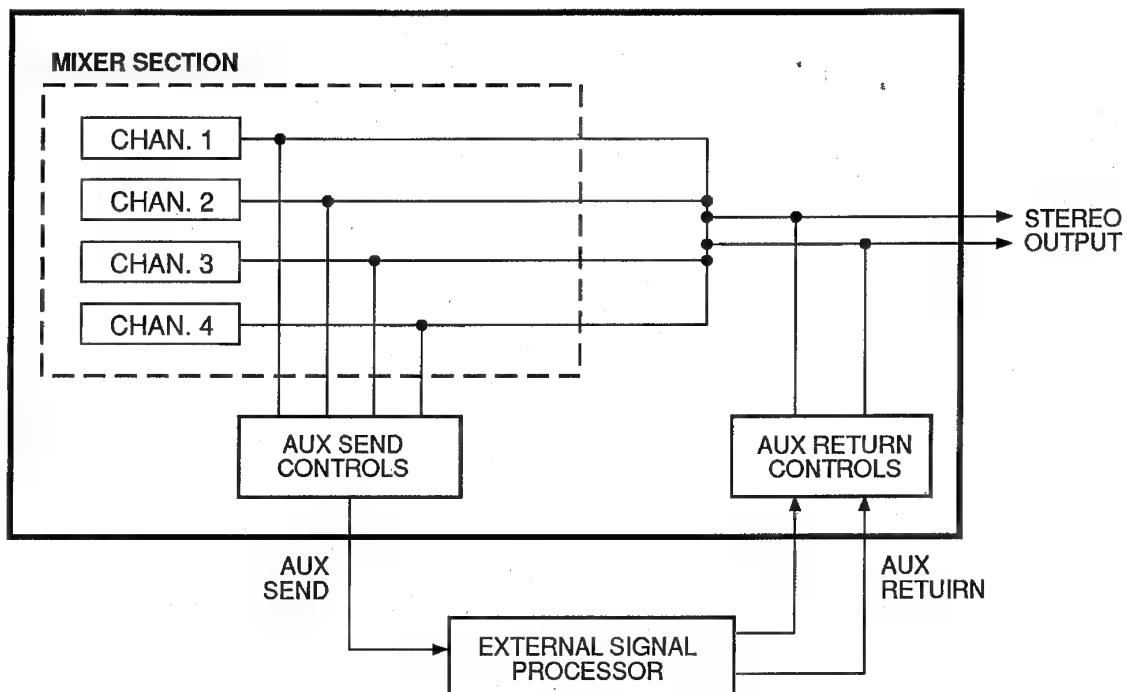
## Processing Individual Tracks In Mixdown Using TAPE OUT Jacks



# USING THE AUX SEND/RETURN LOOP

The MT120's AUX SEND controls function like a secondary mixer that derives its input signals from the main mixer's four channels and combines them into a mono signal which is delivered via the AUX SEND jack (refer to the diagram below). You can use the AUX SEND controls to create an "effect mix", independent of the main mix, thus adding the required degree of effect to each channel signal. The AUX SEND signal is sent to the input of an external signal processor (reverb, echo or other effect device), and the output from the signal processor is returned to the AUX RETURN jacks. The level of the signal received at the AUX RETURN jacks can be adjusted using the AUX RETURN control, and the resulting signal is combined with the MT120's main stereo output signal.

Since the returned effect signal is combined with the mixer's stereo output signal, the AUX SEND/RETURN loop can be used in mixdown to add an effect to tracks when they are being recorded. In this case tracks must be assigned to tape using the "panned channel-to-track" assignment method (see page 13).



**[Note]** Since the AUX SEND/RETURN loop returns the effect signal to the mixer section's stereo outputs, effects can be added to channels during ping-pong recording as long as the panned channel-to-track assignment method is used. The AUX SEND/RETURN loop cannot be used to add effects when recording tracks which have been assigned using the direct channel-to-track assignment method.

# PUNCH-IN/OUT RECORDING

Punch-in/out recording makes it possible to re-record a short segment of an otherwise perfect track in order to correct a mistake or "brush up" an important passage. You "punch-in" at the point where you begin recording the new segment, and "punch-out" at the end of the new segment so that the previously-recorded material is not erased.

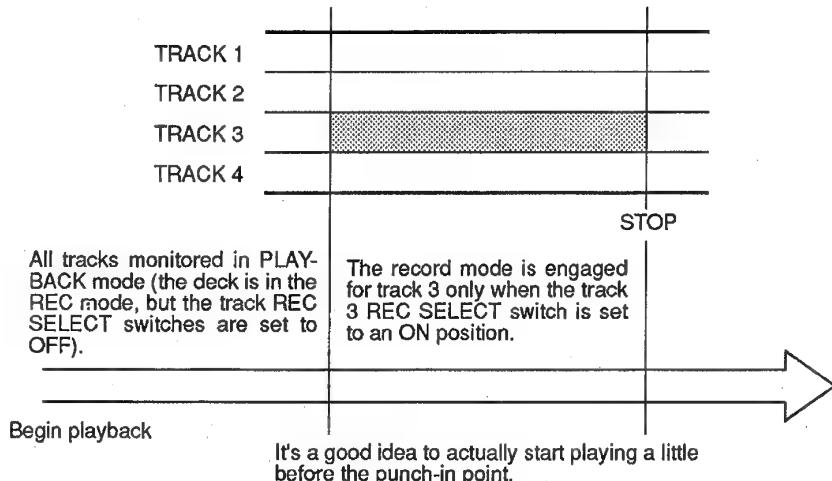
## Punch-in/out Using the REC SELECT Switches

1. With all REC SELECT switches set to OFF, start the recorder running — a few measures before the section to be re-recorded begins — in the record-ready mode by pressing the REC/PAUSE button and then the PLAY button with all track REC SELECT switches set to OFF. The red REC/PAUSE LED will flash indicating that the transport is in the record-ready mode. The MONITOR SELECT switch should be set to MONITOR so you can hear all the tracks.
2. At a convenient break in the track switch the track to be corrected to the record mode (punch-in by switching the REC SELECT switch for that track to the appropriate record position) and start playing the new material to be recorded. The REC/PAUSE LED will light continuously as soon as the REC SELECT switch is set to a record position.
3. At the end of the re-recorded segment switch the track back to the play mode (punch-out by switching the REC SELECT switch for that track to OFF). The red REC/PAUSE LED will begin to flash.

## Footswitch Punch-in/out

1. Plug a YAMAHA FC4 or FC5 (optional) footswitch into the MT120 PUNCH I/O jack.
2. Set the REC SELECT switch for the track to be punched-in to the appropriate record position, and press the REC/PAUSE button to activate the rec/pause mode. The red REC/PAUSE LED should flash instead of lighting continuously. If the red REC/PAUSE LED lights continuously, press the footswitch once so that it flashes. If the LED lights continuously, press the footswitch once so that it flashes.
3. Press the PLAY button to start the transport running in the record-ready mode.
4. Press the footswitch to punch-in. The red REC/PAUSE LED will light continuously.
5. Press the footswitch a second time to punch-out. The red REC/PAUSE LED will begin to flash.

**CAUTION: WHEN USING A FOOTSWITCH, MAKE SURE THE RED REC/PAUSE LED LIGHT IS FLASHING, NOT STEADY BEFORE PUTTING THE TRANSPORT IN RECORD. THIS WILL PREVENT ACCIDENTAL ERASURE OF EXISTING MATERIAL. DO NOT PRESS REC/PAUSE AND PLAY.**



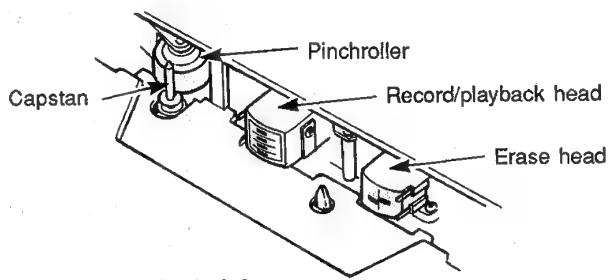
## MAINTENANCE

The MT120 recording & playback head has been precision-constructed to extremely fine tolerances in order to make high-quality 4-track recording possible. Optimum performance can only be achieved if the head surface is kept immaculately clean. Cleaning should be carried out at regular intervals — at least after every 10 hours of use.

Dirty heads can cause any of, or a combination of, the following problems:

- Recording, playback and erasure are not possible.
- Reduced playback sound level.
- Fluctuating and/or distorted sound.
- Excessive noise.
- A drop in level at the high frequencies.

If any of the above problems occur, clean the heads careful **before** assuming the fault is with the recorder. Use a commercially available head-cleaning kit (read the instructions provided with the kit), or wipe carefully with a cloth or cotton swab that has been dampeden with isopropyl alcohol. Also clean the pinch roller at the same time as the heads.



# SPECIFICATIONS

## TAPE TRANSPORT

Tape Type	Chrome (70 microsec. EQ)
Heads	4-channel Permalloy rec/play head 4-channel ferrite erase head
Tape Speed	4.8 cm/sec., 9.5 cm/sec.
Pitch Control	Approx. $\pm 10\%$
Wow & Flutter	Less than 0.12% WRMS
Rewind Time	Approx. 110 sec., for C-60 tape
Motor	DC servo motor

## CONNECTORS

Input 1 — 4	Input Impedance Rated Input Level Max. Input Level Min. Input Level Input Impedance Rated Input Level Min. Input Level Output Impedance Load Impedance Rated Output Level Load Impedance Max. Output Level Output Impedance Load Impedance Rated Output Level Output Impedance Load Impedance Rated Output Level	10 k-ohms -10 dB to -50 dB (fader nominal) +10 dB (gain control min.) -56 dB (gain control, fader max.) 10 k-ohms -10 dB (AUX RETURN level control nominal) -16 dB (AUX RETURN level control max.) 1 k-ohm Greater than 10 k-ohms -10 dB into 50 k-ohms 8 to 40 ohms 45 mW + 45 mW/40 ohms 1 k-ohm Greater than 10 k-ohms -10 dB into 50 k-ohms 1 k-ohm Greater than 10 k-ohms -10 dB into 50 k-ohms 1 k-ohm Greater than 10 k-ohms -10 dB into 50 k-ohms
AUX RETURN L & R		
STEREO OUT L & R		
PHONES		
TAPE OUT 1 — 4		
AUX SEND		
MONITOR OUT L & R		

## ELECTRICAL SPECIFICATIONS

Frequency Response (NR OUT)	40 Hz to 18 kHz, $\pm 3$ dB at 9.5 cm/sec. 40 Hz to 13 kHz, $\pm 3$ dB at 4.8 cm/sec.
S/N ratio (3% THD Level)	85 dB, dbx ON, IHF-A
Distortion	1.0% at 315 Hz, dbx ON, -13 dB Rec. Level
Channel Separation	Greater than 65 dB at 1 kHz, dbx ON, (B.P.F)
Erasure Ratio	Greater than 70 dB at 1 kHz, dbx ON
Noise Reduction	dbx *
Graphic Equalizer	100, 400, 1k, 5k, 10kHz ( $\pm 10$ dB), Q = 0.7

## GENERAL

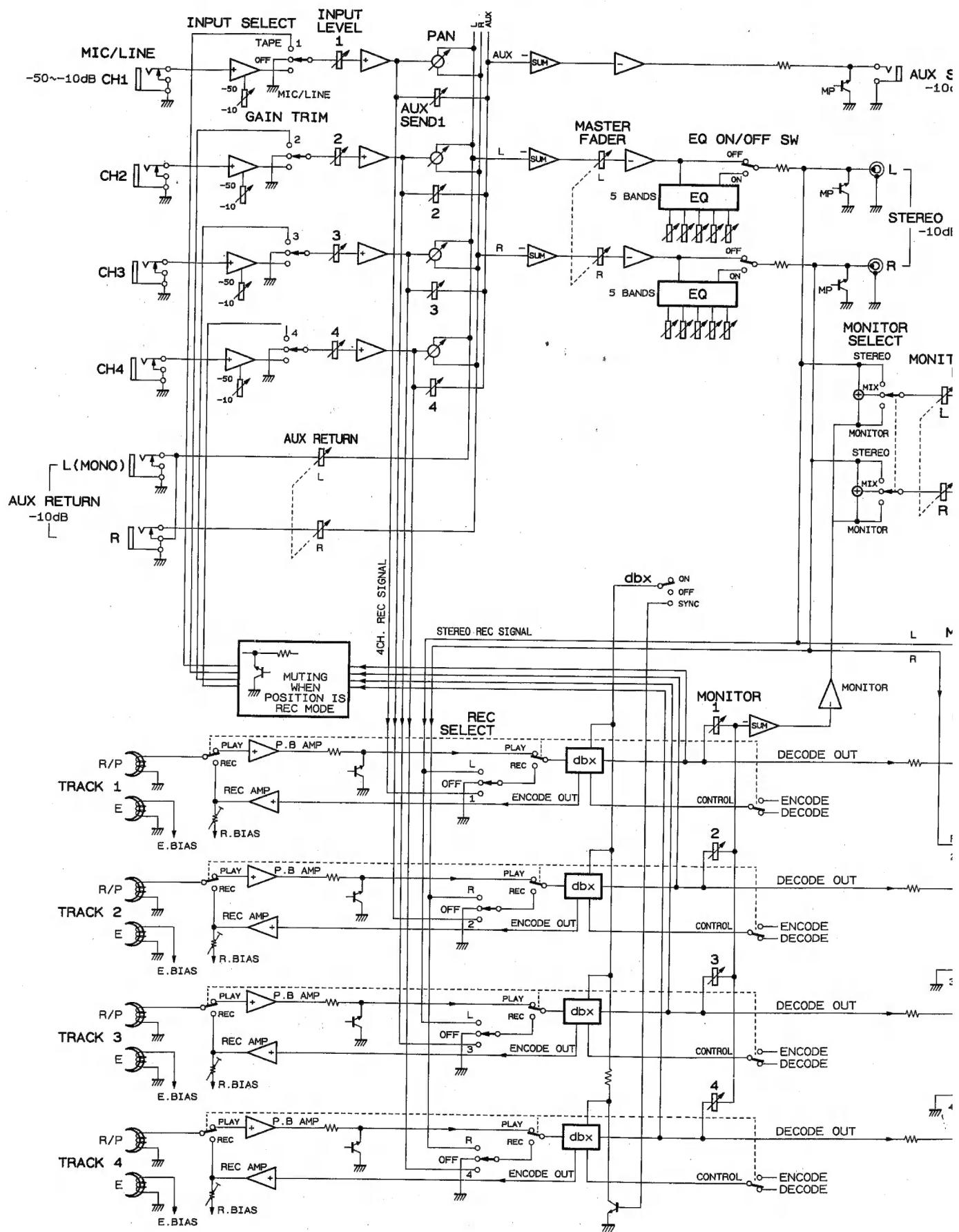
Power Requirements	U.S. & Canadian Models: 120 V AC, 60 Hz UK Model: 240 V AC, 50 Hz General Model: 230 V AC, 50 Hz
Power Consumption	16 W
Dimensions (WxHxD)	410 x 80.8 x 237 mm (16-1/8" x 3-3/16" x 9-5/16")
Weight	2.6 kg (5 lbs 12 oz)

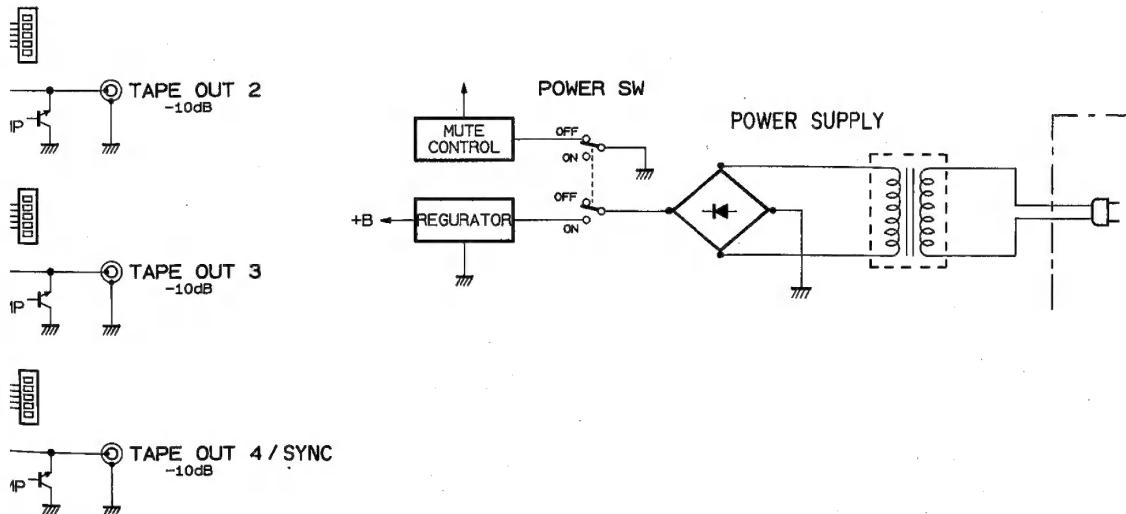
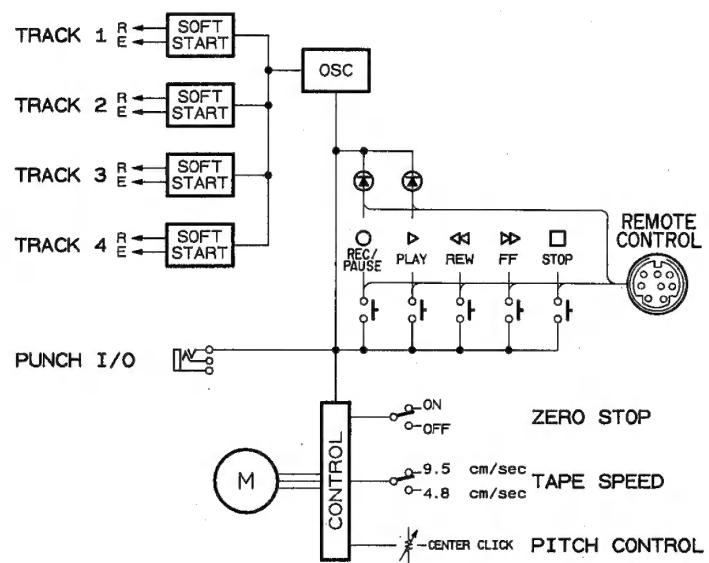
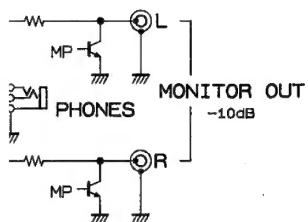
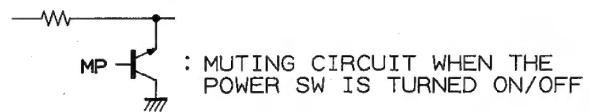
\* dbx is a trademark of dbx Incorporated.

0 dB = 0.775 Vr.m.s.

All specifications subject to change without notice.

# BLOCK DIAGRAM / SCHEMA DE PRINCIPE / BLOCKDIAGRAMM





**CAUTION**

The power switch does not disconnect the complete apparatus from the mains line.

**ATTENTION**

L'appareil reste toujours sous tension lorsque la touche secteur est en position arrêt.

**ACHTUNG**

Das Gerät steht auch bei der Netzschalter-Stellung "Aus" noch unter Spannung.

**OBSERVERA**

Apparaten kopplas inte bort från växelströmskällan (nätet) så länge som den är ansluten till vägguttaget, även om själva apparaten har stängts av.

**ADVARSEL**

Netspændingen til dette apparat er IKKE afbrudt, sålænge netledningen siddr i en stikkontakt, som er tændt - også selvom der er slukket på apparatets afbryder.

**VAROITUS**

Laitteen toisiopiiriin kytketty käyttökytkin ei irroita koko laitetta verkosta.

**AVVERTENZA**

L'apparecchio rimane sotto tensione anche quando è spento tramite l'interuttore principale.

**SERVICE**

This product is supported by YAMAHA's worldwide network of factory trained and qualified dealer service personnel. In the event of a problem, contact your nearest YAMAHA dealer.

**ENTRETIEN**

L'entretien de cet appareil est assuré par le réseau mondial YAMAHA de personnel d'entretien qualifié et formé en usine des concessionnaires. En cas de problème, prendre contact avec le concessionnaire YAMAHA le plus proche.

**KUNDENDIENST**

Für dieses Gerät steht das weltweite YAMAHA Kundendienstnetz mit qualifiziertem, werksgeschultem Personal zur Verfügung. Bei Störungen und Problemen wenden Sie sich bitte an Ihren YAMAHA-Händler.

# **YAMAHA**